Assurance of a well-controlled and precisely placed intraspinal lesion makes this procedure effective and reasonably safe. Pain as high as the upper cervical area is amenable to treatment. Since general anesthesia, open surgical procedures and prolonged recuperation are avoided, it is well tolerated, even by chronically ill and debilitated patients. In the event that pain eventually recurs, the procedure can easily be repeated.

Percutaneous radiofrequency cervical cordotomy significantly augments the neurosurgical therapeutic armamentarium by extending the indications and applications of surgical treatment of pain. It merits consideration when drug therapy, electroneurostimulation, alternative ablative neurosurgery and behavioral modification therapy are ineffective or inappropriate, and can be optimum treatment in pain syndromes of malignant origin.

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Rheumatoid Arthritis Quadriplegia

IN THE PAST FEW YEARS increasing attention has been focused on the complications of rheumatoid arthritis. It has become clear that not only is the cervical spine frequently involved in this disease, but that atlantoaxial subluxation is relatively common. Atlantoaxial subluxation may not only cause severe symptoms, it may threaten the integrity of the spinal cord and lead to quadriplegia or sudden death. It is, therefore, incumbent on physicians to recognize this complication and treat it.

Common signs and symptoms of spinal cord compression are difficult to evaluate because of joint and muscular changes. Hand paresthesias, weakness in one or both lower extremities, mild weakness of hip flexors to severe quadriplegia can occur. Reflex changes and sensory alterations are helpful.

Radiological studies, including lateral views of the cervical spine in extension and flexion, tomography and cinefluorography will show the forward subluxation of the atlas, producing compromise of the neural canal. Myelography is rarely needed.

Conservative management consists of the use of a cervical collar or brace to lessen spinal cord trauma.

Fusion to immobilize the subluxing segments of the occipital cervical junction can be done by wiring the two upper cervical segments and fusing with iliac bone. Satisfactory decompression of the spinal cord and an arrest of progressive neurological changes can be accomplished.

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Percutaneous Thermocoagulation of the Trigeminal Ganglion

FACIAL PAIN of paroxysmal trigeminal neuralgia or tic douloureux is an intractable and disabling affliction. Current treatment follows a consecutive regimen beginning with medical management using such drugs as diphenylhydantoin (Dilantin®) and carbamazepine (Tegretol®). In the event drugs are ineffective, nerve blocks and avulsions usually are attempted. If pain recurs, operative procedures may be carried out on the trigeminal nerve, ganglion or tract through the customary subtemporal or suboccipital approach.

Percutaneous thermocoagulation of the trigeminal ganglion represents a new and effective surgical approach to the trigeminal nerve in the treatment of trigeminal neuralgia and, to a lesser extent, facial pain of other causes. Although popular in Europe several decades ago, the procedure was abandoned because of an unacceptably high morbidity and mortality. Refinements in technique made possible through advances in radiology and electronic bioengineering have assured its acceptance in this country.

The procedure is done under local anesthesia, which is usually supplemented by the intravenous administration of a short-acting barbiturate (Brevital®). Under x-ray monitoring, a needle electrode is introduced percutaneously into the gasserian ganglion through the foramen ovale. The electrode can be placed selectively into any of the three divisions depending upon the distribution of pain. Final electrode placement is verified by stimulation. A radiofrequency generator is used to make a thermal lesion, the size of which is a variable of power output and time. Lesion making is monitored by a thermistor. Through selective coagulation, pain relief can be achieved by producing marked hypalgesia in the affected division avoid-

ing total anesthesia and loss of the corneal reflex.

This procedure is effective and reasonably safe, making it acceptable to both patients and physicians. By eliminating the stresses and dangers of a general anesthetic, an open operative procedure and a prolonged period of recuperation, the procedure is well tolerated even by elderly and debilitated patients. In the event pain recurs it can readily be repeated. Percutaneous thermocoagulation of the trigeminal ganglion represents a reasonable alternative to the surgical treatment of facial pain and rapidly is becoming the treatment of choice for trigeminal neuralgia after the failure of medical management.

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Intracerebral Hematoma

HEMORRHAGE WITHIN BRAIN SUBSTANCE is a common cause of major neurologic disability and death. It may occur under many circumstances, but is most commonly seen in hypertensive patients of both sexes, usually occurring during periods of activity and producing neurologic symptoms and signs over a short time-interval, sometimes within minutes and usually within 24 hours. Unlike subarachnoid hemorrhage, secondary to aneurysms, the hemorrhage does not tend to recur. Brain tissue may be destroyed, but often is compressed and displaced. With the advent of computed tomographic scanning, lumbar puncture usually is not necessary. Severe headache is a very common, but not invariable, accompaniment of the development of intracerebral hematoma.

The probable presence of hematoma within the brain may be established on clinical grounds in most cases, and may be confirmed by the finding of an avascular mass on angiography. Computerized axial tomography will accurately identify the presence, size, configuration and location of an intracerebral hematoma, or identify a coexisting primary vascular lesion. Possibly of greatest importance is that the neurological deficits produced by an intracerebral hematoma may be reversed by surgical removal of the mass, with relief of brain compression and often a dramatic return of the neurologic status toward normal. The combination of the availability of recent, accurate and safe diagnostic and surgical techniques, including brilliant illumination and direct visualization afforded by the operating microscope following removal of the hematoma, justifies an active and energetic approach to every patient in whom the presence of intracerebral hematoma is suspected.

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Penetrating Brain Injury

BRAIN TRAUMA secondary to intracranial passage of a bullet or other object is one of the most serious categories of central nervous system injury. However, a commonly held belief that all such trauma is uniformly fatal is unfounded. There are several reasons for optimism following prompt, aggressive surgical treatment in selected cases, as extensively documented in both military and civil experience.

First, the site of brain injury may be superficial, or confined to "silent" or less critical areas such as frontal or temporal tip. Second, the site of skull penetration, with frequently associated complex fracture, may provide immediate decompression and relief, or control in part, of rising intracranial pressure. It may be for this reason that every neurosurgeon has seen cases of loss of some brain tissue through the skull aperture with later recovery. Third, the missile tract itself may be slender and the elevated pressure and neurologic findings may be the result of the presence of hematoma, within or adjacent to the tract. Such hematoma may be extruded from tract during exploration, and removal often is followed by restoration of normal intracranial pressure. The improvement in neurologic status is sometimes immediate and striking.

Passage through the brain of high velocity missiles may be expected to produce more widespread cerebral injury. A complication of both low and high velocity trauma is the later development of cerebral abscess, if debridement with removal of bone fragments has been incomplete. In all cases, x-ray studies of the skull are required to show the extent of bony injury, the position, when present, of in-driven bone fragments, and the precise trajectory involved. Both angiography